

MICROSTATION DETAILING AND SETTING CONVENTIONS

GENERAL

This document is being provided to give direction regarding the methods of detailing and MicroStation settings used in the Bridge Office.

Many changes have been made during the conversion from MicroStation J to MicroStation v8. Some of the most obvious changes can be seen in the working units, the introduction of models and the use of levels. A brief explanation of what the Bridge Office is doing and what resources are available to you are included in each of the following sections. A dgn has been placed on our web site to provide an example of how the Bridge Office is setting up bridge plans.

You will notice that our bridge plans are being assembled into a single dgn using models. While this method of packaging bridge plans into a single dgn works well for the Bridge Office, it may not work for you as a consultant. Single drawings per design file are also acceptable.

CONFIGURATION

Engineering Systems at IDOT has created a directory structure containing many of the necessary configuration and resource files for preparing road and bridge plans. It is available at <http://www.dot.il.gov/cadd.html>. It is a single download titled "idotcad V2004.exe". Should you decide to use this, you should place the resource files downloaded from the Bridge Office web site into the locations set up in the environment's directory structure.

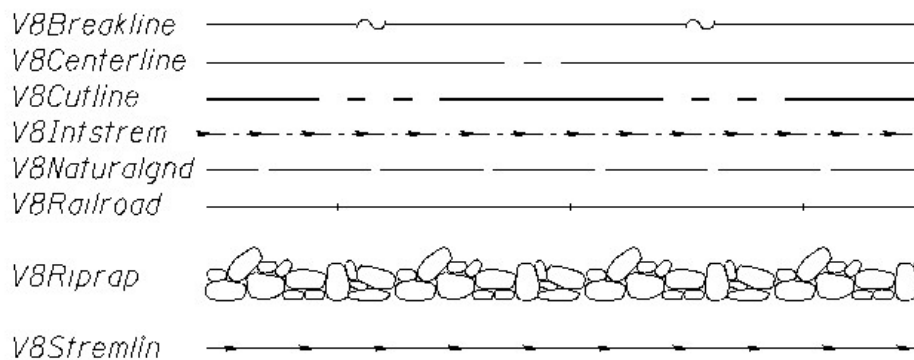
All of the bridge files downloaded from the Bridges and Structures CADD Support web site (<http://www.dot.il.gov/bridges/bscadd2.html>) should take precedence over any files that exist in "idotcad V2004.exe" with the exception of two. The files titled "units.def" and "IDOTLevel2004.dgnlib" were created and are maintained by Engineering Systems at IDOT. They were merely included for download on the Bridge Office web site in the event that you choose not to use their environment.

When beginning any project, be sure that you are using the latest resource files and dgnlib's.

RESOURCE FILES

Following are the resource files that are necessary for the preparation of bridge plans:

- Bridge.tbl: This is the Bridge Office color table.
- fontlib.rsc: The font library has not changed from MicroStation J to MicroStation v8.
- Units.def: This is the units definition file for selecting the proper working units.
- V8BridgeLineStyle.rsc: This is a revised resource file specifically for MicroStation v8. The following page contains a listing of the line style names and how they appear in MicroStation v8.



DGNLIB

Dgnlib's are basically design files that are set up with predefined settings commonly used. Whenever an element is placed in a design file, MicroStation looks at the dgnlib for those properties or settings which then become part of that design file. If changes are made to the dgnlib, they are not automatically updated in the design file. The settings can, however, be updated from the revised dgnlib by executing the key-in "dgnlib update all". The available dgnlib's are:

- BridgeStyles.dgnlib: This dgnlib contains the text styles and dimension style used in the preparation of bridge plans.
- IDOTLevel2004.dgnlib: This dgnlib contains the levels with assigned symbologies for the different disciplines within IDOT.

LEVELS / SYMBOLOGY

Levels are now set up in the file "IDOTLevel2004.dgnlib". This library was set up for all of the disciplines within IDOT. In it, all of the symbologies are set. This includes the level name, color number, line style and weight for each of the levels. When drawing, all one has to do is select the level of what they want to draw and all of the associated symbology is automatically changed. (Please note that the attribute buttons for color, line style and weight need to be set to "By Level" in order for it to work properly). There are instances where overriding these attributes will be allowed. For bridges, it will be allowed on the levels named "Bridge_Pattern", "Bridge_Miscellaneous" and "Soils_Boring Logs". Filters have been set up to make it easier to locate a particular discipline's group of levels.

For bridges, there are basically four major groups of levels. The next page shows a table containing all of the bridge levels. The text is shown in color to show the four basic groups. They are as follows:

- Design levels(magenta text) - specifically for the creation of the bridge design plans.
- Planning levels (green text) - planning levels for the creation of the plan and elevation views of the TS & L as well as the GP & E. The other details on a

TS & L can make use of the Bridge_TSandL or the Bridge_Design levels depending on the need.

- Border levels (red text) are for the borders.
- Common levels (blue text) - The remaining levels are common to both planning and design.

For the TS & L and GP & E, it is acceptable to make use of the roadway levels for elements such as topography and existing elements that are taken from the roadway design.

Level Name	Use
Bridge_Addendum	Level used for addendums
Bridge_Breakline	Breakline (shift position if unable to see pattern)
Bridge_Centerline	Centerline (shift position if unable to see pattern)
Bridge_Construction Change	Level used for construction changes
Bridge_Construction Line	Level used for construction elements
Bridge_Cut or Match Line	Cut or match line (shift position if unable to see pattern)
Bridge_Design Concrete Hidden	Hidden concrete object line for design plans
Bridge_Design Concrete Object	Concrete object line for design plans
Bridge_Design Existing	Existing object line for design plans
Bridge_Design Reinforcement	Reinforcement object line for design plans
Bridge_Design Reinforcement Bending	Reinforcement bar bending diagram object line for design plans
Bridge_Design Reinforcement Existing	Existing reinforcement object line for design plans
Bridge_Design Reinforcement Hidden	Hidden reinforcement object line for design plans
Bridge_Design Steel Hidden	Hidden steel object line for design plans
Bridge_Design Steel Object	Steel object line for design plans
Bridge_Dimension and Text	General text and dimensions
Bridge_Markups	Level for revision notation for designers
Bridge_Miscellaneous	Level where symbology may vary
Bridge_Pattern	Patterning
Bridge_Riprap	Riprap
Bridge_Sheet Border	Border level
Bridge_Sheet Design Plot	Design level for shape that can be used with batch plot
Bridge_Sheet Design Print	Design level for shape that can be used with batch plot
Bridge_Sheet TSandL Plot	Planning level for shape that can be used with batch plot
Bridge_Sheet TSandL Print	Planning level for shape that can be used with batch plot
Bridge_Table Border	Heavy line for use with tables
Bridge_Table Lines	Thin line for use with tables
Bridge_Title	Title level
Bridge_TSandL Concrete Hidden	Hidden concrete object line for GP & E and TS & L
Bridge_TSandL Concrete Object	Concrete object line for GP & E and TS & L
Bridge_TSandL Existing	Existing object line for GP & E and TS & L
Bridge_TSandL Intermittent Stream	Intermittent stream object line for GP & E and TS & L
Bridge_TSandL Natural Ground	Natural ground object line for GP & E and TS & L
Bridge_TSandL Railroad	Railroad track line for GP & E and TS & L location sketch
Bridge_TSandL Reinforcement	Reinforcement object line for GP & E and TS & L
Bridge_TSandL Reinforcement Existing	Existing reinforcement object line for GP & E and TS & L
Bridge_TSandL Reinforcement Hidden	Hidden reinforcement object line for GP & E and TS & L
Bridge_TSandL Right of Way	Right of Way line for GP & E and TS & L
Bridge_TSandL Steel Hidden	Hidden steel object line for GP & E and TS & L
Bridge_TSandL Steel Object	Steel object line for GP & E and TS & L
Bridge_TSandL Streamline	Stream object line for GP & E and TS & L
Soils_Boring Logs	Soil boring logs (symbology may vary)

TEXT STYLES

Text styles are a new feature in MicroStation v8 that greatly simplifies the placement of text. If you are working in the model containing the “full size” border, picking a text style automatically adjusts the text settings. It is no longer necessary to manually change the font, text height, text width, line spacing or other properties on an individual basis.

The first table shown below contains the sizes and spacing that are typically used in a “full size”, 24”x36” set of bridge plans. The text styles shown in the second table use these settings. These text styles exist in the file named “Bridge_Styles.dgnlib”.

English settings					
	font	height	width	line spacing	underline
General text	30	0.14	0.14	0.10	no
Subscripts	30	0.10	0.10	NA	no
Top of Slab Elevations	31	0.14	0.14	0.10	no
Boring log text	107	0.09	0.09	NA	no
Titles	30	0.20	0.20	0.20	yes*

* Set underline spacing in workspace/preferences/text to 33%.

Text styles	Use
Br1:001scale100	subscript and superscript
Br1:001scale140	Callouts, dimensions and notes
Br1:001scale200	Titles
Br1:001scale_boring	In-house boring log text
Br1:001scale_TOS_Elev	Top of slab elevation table text

DIMENSION STYLES

A dimension style was also created and exists in BridgeStyles.dgnlib. The dimension style Bridge1:001 was set up with basic settings. It can be modified for a particular situation because the dimension style becomes a part of the design file once it is used.

WORKING UNITS

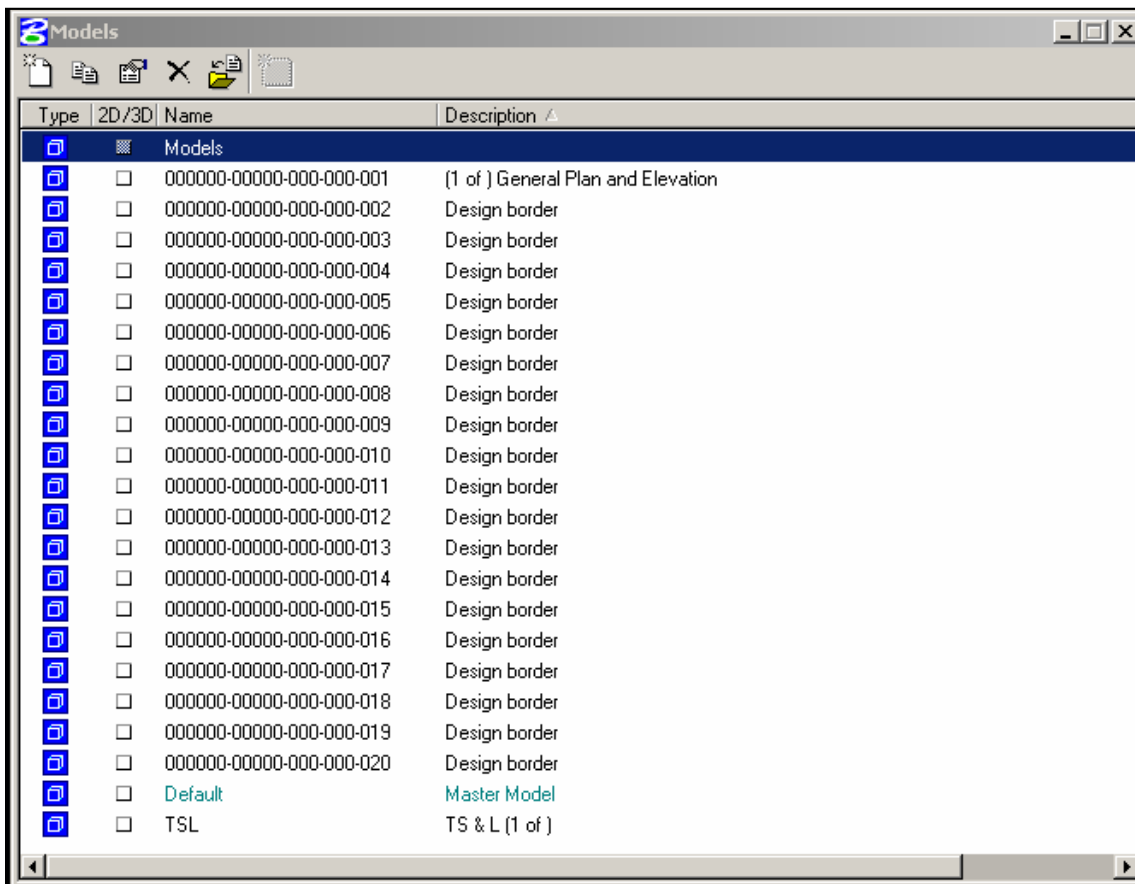
The working units are now set in survey feet for the master units and survey inches for the sub-units. The resolution was adjusted so that the Bridge Office would match the units used in the preparation of roadway plans. It is set to 1000 units per survey foot. This change makes it simpler to make use of electronic data from the roadway side. It also allows for the use of auto-dimensioning

SEED FILE

A single seed file was created named ebridge.dgn. This seed file merely contains initial design and planning models along with a Default model which the Bridge Office will not use. In addition to this, the working units have been set up and the coordinate readout has been set to Sub Units. The model for the TS & L contains a blank planning border whose outer plot border is 1'-10" x 2'-11". In the same manner, the model for the GP & E contains a blank design border of the same size. Additional design models were also added for the remaining sheets of the design plans, all of which contain borders of the same size. Models can be added or removed as required.

The following page contains a screen shot of the models dialog box showing the contents of the seed file “ebridge.dgn”.

The borders are placed with the lower left, innermost border at xy=0,0.

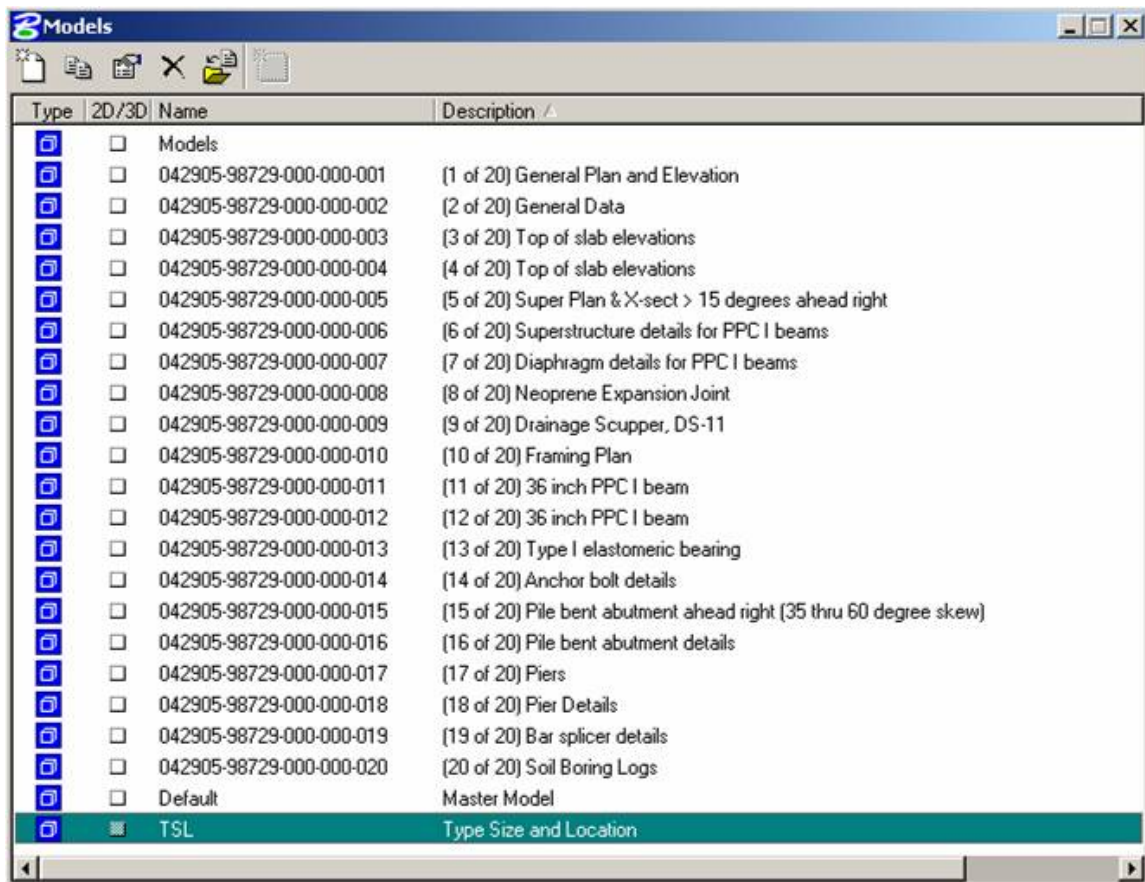


MODELS

Another major change in MicroStation is the addition of models. The model concept allows for multiple drawings within a single design file. The Bridge Office is making use of the new model concept by making each sheet of a set of design plans its own model. The main file name is merely the structure number.

The Bridge Office is currently naming the models using the same naming convention used for electronic proposals and plans posted on IDOT's web site under Letting and Bidding Information with a minor change. Each model appears as: Letting-Contract-000-000-page number.

As an example, for contract 98729 on the April 29, 2005 letting, the GP & E model would be named: 042905-98729-000-000-001. The descriptions identify what is contained in each model. The screen shot on the following page shows the "Models" dialog with an example of the model names and descriptions for a project.



It is important to note that the model concept may or may not work for you as a consultant. The model concept is merely a nice way of packaging a set of design files. It is no different in concept than having individual design files for each sheet.

CELL LIBRARIES

Although the cell libraries appear as they did in previous versions of MicroStation, they are quite different. Cell libraries are now basically drawings that utilize the design model concept, but maintain the previous extension of “cel”. Each “cell” in a cell library is a design model. The cell libraries can be used just as they could be in previous versions, they can be imported into a design file using the models dialog or they can be opened and manipulated just as any other design file.

The Bridge Office has several cell libraries that are available to you to aid in the preparation of bridge plans. Most of the cell libraries contain “base sheets” which are either complete or else require modification in order to be included with your design plans. It is important to be aware that the prints of these base sheets included in the Bridge Office manuals (paper or electronic) are only a snapshot in time. Revisions are periodically made to the base sheets and the revised copies are placed on the Internet at <http://www.dot.il.gov/bridges/bscadd2.html>. Emails are sent to subscribers of the IDOT Bureau of Bridges and Structures Subscription Service whenever these revisions are posted on the Internet for your use.

The other cell libraries that are available contain individual details or elements that can be used during bridge plan preparation. Notifications are sent out when these are revised also.

At the same web site, pdf files have also been created for each of the cell libraries. Each pdf contains a table of contents as well as individual images of the cells or base sheet cells. The table of contents for each library contains links to each of the cell images. There also exists a master table of contents which contains bookmarks that link the cell library pdf files together provided that they are all placed in the same directory.

PLOTTING

Following is a table showing the line thicknesses used on a "full size", 24"x36" plot. The line weights for reduced plans should be proportionally smaller.

weight	thickness (in inches)
0	0.005
1	0.010
2	0.015
3	0.020
4	0.025
5	0.030

DRAWING SCALES

Although drawings do not have to be to scale, there are times when it is beneficial to do so. The table below lists the common architectural and engineering scales that are used.

If you refer to the Bridge Sample.dgn available on our web site, the pier detail sheet (21 of 27) references the model named "Pier" where the Top Plan, Elevation and End View are drawn full size. All three of these views are referenced at 1:32 which is $3/8" = 1'-0"$ on a "full size" set of plans.

Architectural Scales	
	Scale
1:192	$1/16" = 1'-0"$
1:128	$3/32" = 1'-0"$
1:96	$1/8" = 1'-0"$
1:64	$3/16" = 1'-0"$
1:48	$1/4" = 1'-0"$
1:32	$3/8" = 1'-0"$
1:24	$1/2" = 1'-0"$
1:16	$3/4" = 1'-0"$
1:12	$1" = 1'-0"$
1:8	$1\ 1/2" = 1'-0"$
1:4	$3" = 1'-0"$

Engineering Scales	
	Scale
1:720	$1" = 60'$
1:600	$1" = 50'$
1:480	$1" = 40'$
1:360	$1" = 30'$
1:240	$1" = 20'$
1:120	$1" = 10'$
1:60	$1" = 5'$

SHEET SEQUENCE

Our design plans are typically set up in the following order:

- General Plan and Elevation
- Footing Layout (if required)
- Stage Construction Details (if required)
- Temporary Barrier or Rail Details
- Top of Slab Elevations
- Superstructure (Plan and Cross Section)
- Superstructure Details
- Diaphragm Details (for bridges with integral or semi-integral abutments)
- Expansion Joint Details
- Drainage Scuppers
- Bridge Rail Details
- Girder and Framing Details (Steel or Concrete)
- Bearing Details
- Anchor Bolt Sheet
- Abutment
- Pier
- Piles
- Bar Splicer Assembly Details
- Cantilever Forming Brackets
- Soil Boring Logs

WEB PAGE

<http://www.dot.il.gov/bridges/brdocuments.html>

The cell libraries and additional CADD resources are available under Bridges and Structures CADD Support. Other pertinent information related to bridges is also accessible from this page.

SUBSCRIPTION SERVICE

If you have not done so yet, please sign up for the Bridges and Structures Subscription Service. Notifications will be sent out via email whenever changes are made to any items that are on our Documents, Manuals and Procedures web page. The Bridge Office encourages both designers and technicians to sign up for this service.

QUESTIONS, COMMENTS OR SUGGESTIONS

If you have any questions, comments or suggestions, please feel free to contact:

Michael B. Mossman

CADD Unit Supervisor
Bureau of Bridges and Structures
2300 South Dirksen Parkway
Springfield, Illinois 62764
Phone: (217)-782-1510
e-mail: mossmanmb@dot.il.gov